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(71) Applicant

Fritz Wagener GmbH

Leonrodstr 46

8501 Dietenhofen

Germany

(72) Inventor

Claus P Wagener

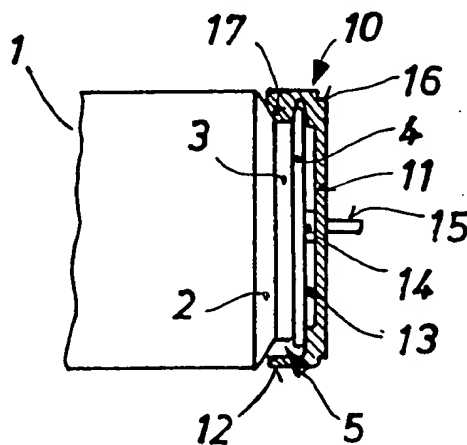
(74) Agents

Marks & Clerk

(54) Fluorescent strip lamp with socket cap

(57) A fluorescent strip lamp comprising a glass tube (1) with end seals, each having an annular bead (4) and groove (3) forming a collar (5). A flexible cap (10) is fitted over each collar and secured by cams (17) on an inner cap wall snapping into the groove and by adhesive cement, setting within two minutes at room temperature provided on at least one cam.

Fig. 1



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Fig. 1

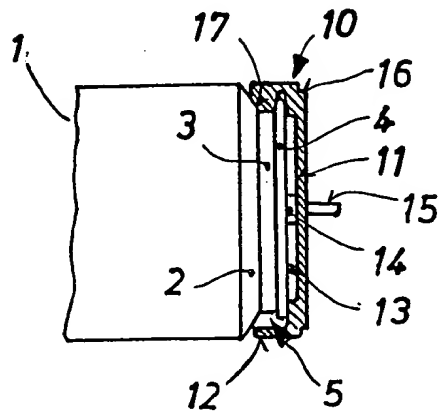


Fig. 2

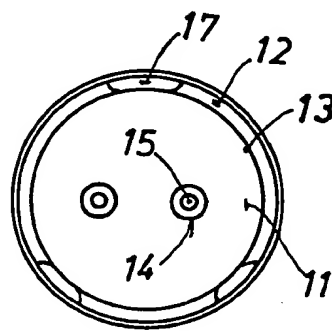


Fig. 3

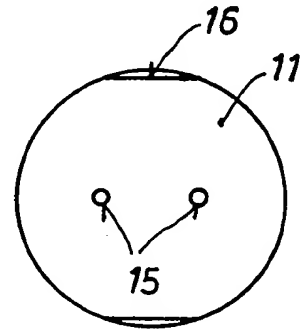
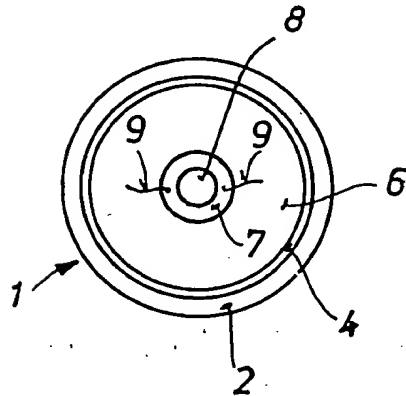


Fig. 4



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Fig. 6

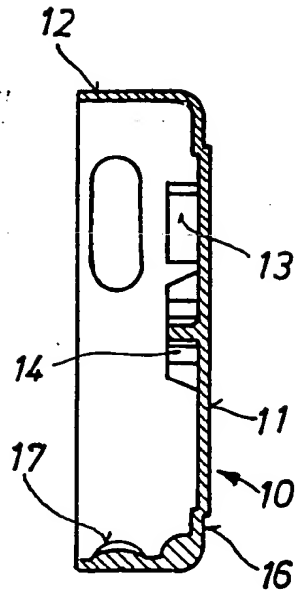


Fig. 5

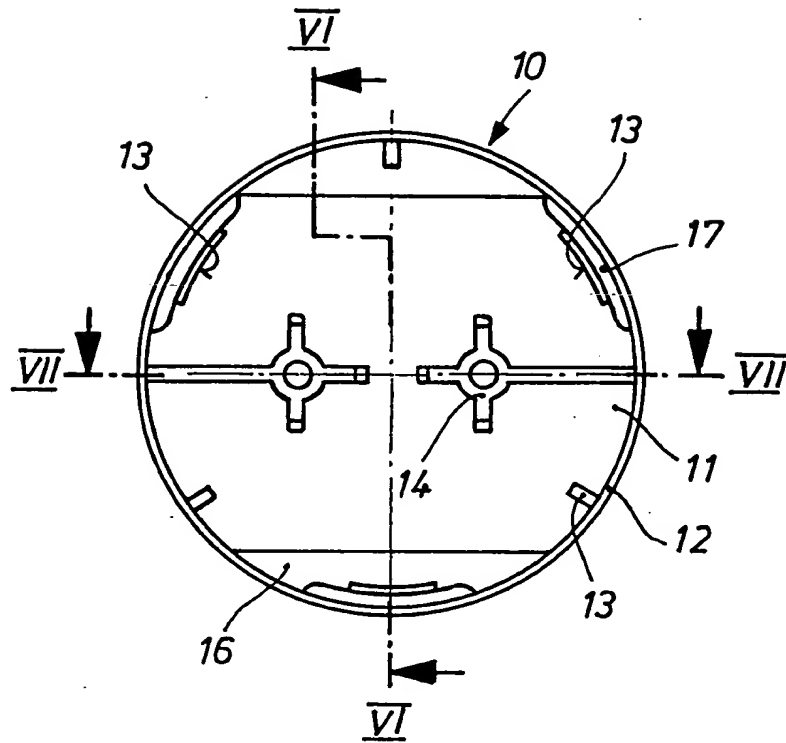
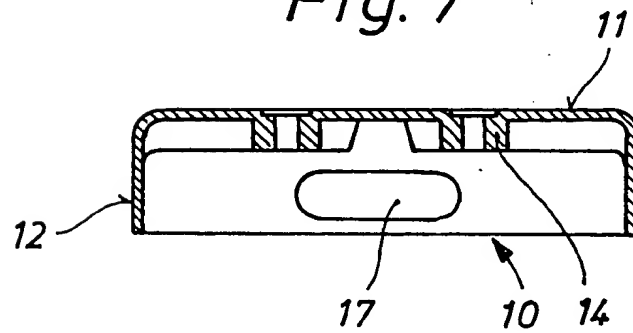


Fig. 7



SPECIFICATION

Fluorescent strip lamp with socket cap

- 5 This invention concerns a fluorescent strip lamp of the kind comprising a glass tube whereof the ends are provided with gas tight seals penetrated by wire terminals and each comprises an annular collar with a continuous circumferential groove formed on the outside thereof over which is pushed the annular wall of a socket cap made of elastically flexible thermoplastics material and carrying contact pins at its frontal end part which pins are connected to said terminal wires, said annular cap wall being secured on said collar against relative longitudinal and rotational displacement by virtue of a projection provided on the inside of the annular wall which is pushed over the collar under elastic deformation of said annular wall and engages as a snap fit in the circumferential groove.

- An existing, currently commercially available fluorescent strip lamp has a socket cap which is made from a hard and brittle duroplastic material and the inside of its annular wall is smooth and cylindrical. The collar is fixed adhesively to the annular wall by means of a continuous circumferential filling of adhesive cement in the groove which requires several hours to set at elevated temperatures. Whilst this cemented joint between the annular wall of the socket cap and the collar of the glass tube will remain firm and even in the presence of dimensional tolerance variations effectively prevent relative longitudinal and rotational displacement of annular socket cap wall and collar, it is a comparatively expensive joint in as much as it requires not only that the cement is applied all around the circumference of the collar and cap wall but, particularly in order to shorten setting times, the application of temperatures in excess of 80°C for which purpose the socket end of the fluorescent tube is heated for a prolonged period by means of gas flames, which is expensive with regard to apparatus outlay and fuel consumption.

- It is, therefore, the aim of this invention to provide a fluorescent strip lamp of the kind specified in which an improved rotationally and longitudinally fixed joint between the socket cap and the glass tube collar is provided.

- According to the invention there is provided a fluorescent strip lamp comprising a glass tube whereof each of the ends is provided with a gas tight seal penetrated by wire terminals and comprises an annular collar with a circumferential groove on the outside thereof over which is pushed the annular wall of a socket cap made of an elastically flexible thermoplastics material and carrying contact pins at its end part which are connected to the terminal wires, said annular cap wall be-

- ing secured on the collar against relative longitudinal and rotational displacement by virtue of a projecting formation on the inside of the annular wall which, under elastic deformation of the annular wall, is pushed over the collar and snaps into the groove, wherein the projecting formation consists of at least two circumferentially spaced apart cams and the elastic deformation suffered by the annular wall is a bending deformation, the end part of the socket cap engaging with the end face of the collar and wherein a spot of an adhesive cement setting within at most two minutes at room temperature is applied to at least one of the cams for adhesive fixation to the collar.

- Thus, the object is accomplished even in the presence of dimensional tolerance variations by virtue of the appropriate configuration of the socket cap and a suitable choice of anti-rotational fixation means at less expense regarding apparatus outlay and fuel consumption. The relatively rotational fixation of socket cap and collar is achieved, without having recourse to the provision of projecting or recessed formations in the glass tube itself, in as short a time as possible, using little material and requiring no application of heat.

- The use of thermoplastic material, which may be, for example, polyethylene-terephthalate, polybutylene-terephthalate, noryl- or polycarbonate, all of which are heat stable up to 90-100°C, and the presence of said knubs allow the socket cap to fit securely on the collar and so that it cannot be pulled off. If the dimensions of collar and socket cap are accurately co-ordinated this fit is so firm that the cap virtually cannot be turned on the collar, that is to say not by application of forces of the order of magnitude normally liable to be encountered. Any relative rotation which might be permitted by dimensional tolerances in these parts will be prevented by the adhesive cement which has been selected and applied in accordance with this invention without needing heat application or prolonged setting times.

- The adhesive cement which is used in accordance with this invention is a *per se* conventional material, e.g. a cyanoacrylate based adhesive as used for fixing glass to thermoplastics. The setting time may be adjusted to suit prevailing assembly conditions and is preferably no longer than one minute.

- In one embodiment of the invention three cam-like knubs are provided in equi-angularly spaced positions. These cams will always ensure a fully satisfactory snap-fit engagement of the socket cap on the collar of the glass tube. Each of the cams extends, e.g. circumferentially, over an angle between 10 and 20°. This kind of length will ensure a secure snap fit engagement in the annular groove even in the presence of dimensional tolerance variations.

- Conveniently, and with special advantage,

the side of the knob cams which faces the collar is radiussed to marry closely with the groove walls. This improves the engagement of the cams in the groove.

- 5 The socket cap itself has a maximum wall thickness of, e.g. 1.2 mm, and is translucent. A socket cap of this kind will glow almost as brightly as the glass tube itself and not appear as a dark part or region when the lamp is in use. If the inside of the frontal end of the socket cap is equipped with lugs or bosses to carry the contact pins, the end part itself may be designed very slim and translucent.

- Also with special advantage, a projecting spacer lug or shoulder is provided at the junction between the annular wall and the end part of the socket cap which engages with the end face of the collar. The exterior width of the socket cap, measured in the longitudinal direction of the fluorescent tube, is standardised. On the other hand, it is desirable that the end part of the socket cap should engage very closely with the end face of the collar so that any adhesive material which is wiped off the cam when the two parts are fitted together will firmly stick the endside of the collar to the end part of the socket cap. However, if the end part of the latter is slim throughout it can no longer make close contact engagement with the end face of the collar. Such engagement is now achieved by the shoulder or spacer lug against which the adhesive is pushed which is stripped of the cam knobs as the socket cap is pushed over the collar.

- According to another advantageous provision of this invention, the outside of the end part of the socket cap is provided at its outermost edge with a pair of mutually opposite notches. The socket cap is guided in these notches by guide strips when it is fed to the tube during assembly. During the introduction of the tube in the holder fitting the notches also serve to indicate whether the tube occupies the correct position relative to said holder fitting or must be rotated about its longitudinal axis for achieving electrical contact between its contact pins and the corresponding contacts of the holder fitting.

- 50 The invention will now be described by way of example with reference to the accompanying drawings, in which:

- Figure 1 is a side elevation of the end piece of a fluorescent strip lamp of the invention, with a socket cap in section,

- Figure 2 is a rear end view of the socket cap,

- Figure 3 is a frontal end view of the socket cap,

- Figure 4 is a frontal end view of the glass tube of the fluorescent lamp,

- Figure 5 shows a further socket cap, drawn to a larger scale than Figs. 1 to 4,

- Figure 6 is a section taken on line VI-VI in Fig. 5, and

Figure 7 is a section taken on line VII-VII in Fig. 5.

- The fluorescent strip lamp shown in the drawings comprises a glass tube 1 of circular cross section, filled with a fluorescent gas and of identical form at both ends thereof in as much as its cross section tapers towards the end over a short region 2, followed by a continuous circumferential groove 3 and finishing in a continuous circumferential bead 4, said groove and said bead together forming a collar 5. Viewed endwise, the glass tube presents a conical funnel region 6 starting from the bead 4 and merging into a central recess or cavity 7 from which projects a terminal pin 8, and on both sides of this pin 8 a terminal wire 9 extends out of the recess 7.

- A socket cap 10 of circular form viewed frontally endwise, is push fitted over this collar 5 and comprises essentially an end wall or part 11, and an annular wall 12 encircling the collar. On the inside of the end wall 11, along the outer edge thereof, a continuous (Fig. 2), or intermittent (Fig. 5) circumferential spacer formation in the form of a shoulder or ledge 13 is provided which engages with the end face of the collar 5. A boss 14 on each side of the centre of the disc-like end part 11 carries an outwardly projecting contact pin 15. Each contact pin 15 is electrically connected to one of the terminal wires 9. Furthermore, the outer edge on the outside of the end wall 11 is provided with notches 16 which are parallel to the interconnecting line between the two contact pins 15.

- The inside diameter of the annular wall 12 is greater than the outside diameter of the bead 4 leaving a gap between wall and bead. On the inside of the annular wall 12 there are three elongated cams or knibs 17 whereof the inner ends are situated on a circle of smaller diameter than the outside diameter of the bead 4. These three cams 17 are pushed over the bead 4 by elastic deformation of the intervening annular wall regions and snap into the groove 3. The side of each cam which faces the collar is radiussed to marry closely with the groove 3.

- A spot of adhesive cement is applied to one or more of the claims 17 prior to pushing these over the collar whereby the cams are adhesively fixed to the groove region of the glass tube. If such adhesive material is stripped off the cam when the end cap is pushed over the bead 4, it will just stick the bead 4 firmly to the end part 11 of the socket cap, or rather to the shoulder 13 formed thereon.

- The cement sets within at most, two minutes at room temperature.

CLAIMS

1. A fluorescent strip lamp comprising a glass tube whereof each of the ends is provided with a gas tight seal penetrated by wire

terminals and comprises an annular collar with a circumferential groove on the outside thereof over which is pushed the annular wall of a socket cap made of an elastically flexible thermoplastics material and carrying contact pins at its end part which are connected to the terminal wires, said annular cap wall being secured on the collar against relative longitudinal and rotational displacement by virtue of a projecting formation on the inside of the annular wall which, under elastic deformation of the annular wall, is pushed over the collar and snaps into the groove, wherein the projecting formation consists of at least two circumferentially spaced apart cams and the elastic deformation suffered by the annular wall is a bending deformation, the end part of the socket cap engaging with the end face of the collar and wherein a spot of an adhesive cement setting within at most two minutes at room temperature is applied to at least one of the cams for adhesive fixation to the collar.

2. A fluorescent lamp as claimed in claim 1, wherein the side of the or each cam which faces the collar is radiussed to marry closely with the groove.

3. A fluorescent lamp as claimed in claim 1 or claim 2, wherein there is provided the junction between the annular wall and the end wall of the socket cap, a protruding spacer formation engaging with the end face of the collar.

4. A fluorescent lamp as claimed in any one of claims 1 to 3, wherein a pair of mutually opposite notches are provided in the outer edge on the outside of the end part of the socket cap.

5. A fluorescent lamp substantially as hereinbefore described with reference to and as shown in Figs. 1 to 4 or Figs. 5 to 7 of the accompanying drawings.